

ABSTRACT OF THE DISCLOSURE

An internal exhaust gas recirculation amount estimation system calculates an in-cylinder temperature at an exhaust valve closure timing, an in-cylinder pressure at the exhaust valve closure timing, and a gas constant corresponding to a change in a composition of exhaust gas, based on an air-fuel mixture ratio. An exhaust valve closure timing in-cylinder residual gas amount is calculated based on at least the in-cylinder temperature, the in-cylinder pressure, and the gas constant. Also calculated is a valve overlap period blow-back gas amount, which is defined as a quantity of gas flow from one of intake and exhaust ports via a combustion chamber to the other port during a valve overlap period. An internal exhaust gas recirculation amount is calculated based on the exhaust valve closure timing in-cylinder residual gas amount and the valve overlap period blow-back gas amount.